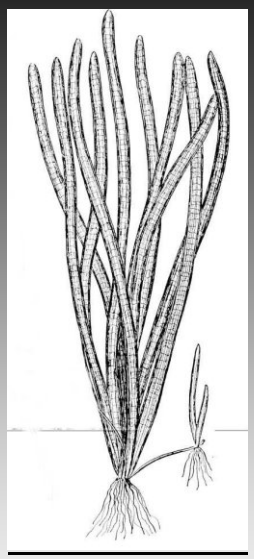


Grade Levels:
6-8

Subject Areas:
Biology, Botany, Environmental Science, Marine Biology

Duration:
45-55 minutes

Skills:
Problem solving, organizing, interpreting, communicating information

How Scientists Identify a Planting Area for Wild Celery

Summary

When you are finished growing your wild celery plants, they will be planted in the Chesapeake Bay. The planting location was chosen based on several criteria including salinity, water quality, depth, wave energy, and sediment type. In this activity, you will learn how to use multiple data sets to choose a wild celery planting site.

Maryland State Assessment Outcomes

Nature of Science: Students will demonstrate the ability to interpret and explain information generated by their exploration of scientific phenomena.
Applications of Science: Students will demonstrate the ability to apply science in solving problems and making personal decisions about issues affecting the individual, society and the environment.
Math – Statistics: Collect, organize, and display data.

Maryland State Assessment Indicators

Nature of Science: Generate a consensus based on data.
Applications of Science: Use knowledge of science and available technology to solve a practical problem.
Math – Statistics: Collect, organize, display, and interpret data for a given situation using appropriate displays. Use data analysis to write an evaluative argument in a real life situation.

Materials

Per class:
One "Mapping Activity Packet" per group of 3-4 students
One set of Transparencies of "Mapping Activity Packet" for entire class to share
Black Transparency Markers or Permanent Markers

Making Connections

You are growing bay grass to plant in the Chesapeake Bay to restore habitat for many bay creatures. Before the bay grass can be planted an appropriate site must be chosen. You will use maps of different factors that affect wild celery growth to determine where wild celery has a favorable chance of survival. Scientists use maps similar to these along with computer software to choose the sites where we will plant the wild celery you are now growing.

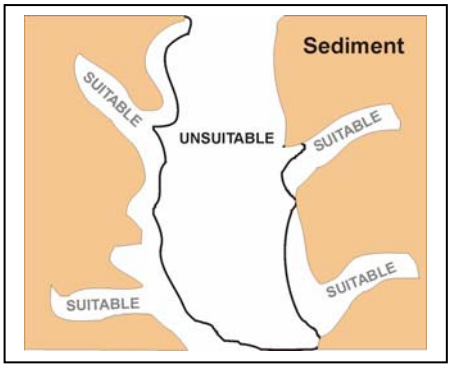
Background

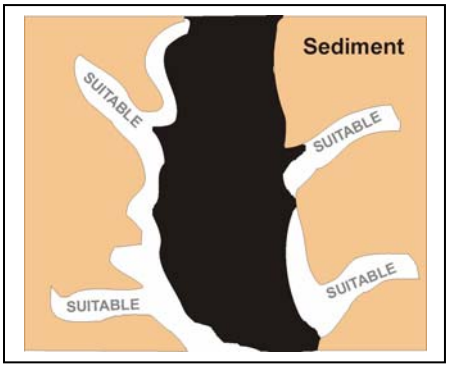
Refer to the *Vallisneria americana* Fact Sheet Lesson for background information about wild celery. Visit the Bay Grasses Identification Key at http://www.dnr.maryland.gov/bay/sav/key/ for additional background information.

Procedure

You will be coloring all habitat areas of the maps not supporting wild celery.

1. Each group of students should have three transparencies with a map on it. Each map will have the same parameter (example: Wave Energy), but each transparency will have a different time period (1600, 1975, and Today).
2. Use the above requirements to determine which areas on your maps are not optimal.
3. Use a black marker to color in any areas that are not suitable for wild celery survival.





4. The entire group should answer the questions below.
    - Which habitat criteria did your group investigate?
    - How did your habitat criteria change during each time period?
    - What trends did you notice?
    - Why do you think these changes have taken place?
5. When all groups have finished coloring the unsuitable areas, one student from each group should present to the group their results and the answers to the above questions.
6. All the maps for the same time period should then be assembled and put on the top of the overhead projector. First, each group should put their 1600 map on the overhead. All 1600 maps should be aligned and any areas of water that are still white are suitable for planting.
7. Next the 1975 maps should be assembled.
8. Repeat the procedure with the Today maps.
9. Answer the "Time Period Questions" as a class.

Habitat criteria for Wild celery

Boat Traffic – Boats can cause damage to wild celery beds through direct or indirect impacts.

Direct impacts – Anchoring, motoring or running aground in wild celery beds will cause damage.
Indirect impacts – Boat traffic can cause wakes or waves which break along shorelines and stir up sediment. High levels of boat activity can

stir up sediments in the shallows for long periods of time thus reducing the amount of light available for wild celery growth.

Use a black marker to color in Boat Traffic areas marked "HIGH".

Depth – Wild celery require adequate sunlight to grow. In areas where the water is very clear, wild celery can grow in deeper water than in areas where the water is turbid. The amount of light reaching underwater grasses such as wild celery is related to the amount of algae and sediment present in the water. Developed areas without adequate natural shoreline buffers consisting of native trees, bushes and grasses allow excess sediment and nutrients to reach the water during heavy rains. The excess nutrients provide food for algae which in combination with suspended sediments blocks out the light reaching the underwater plants. Over time, excess sediment will cause depth of the waterbody to decrease.
1600's Map – Use a black marker to color in all areas deeper than 3 meters.
1975 Map – Use a black marker to color in all areas deeper than 1 meter.
Today Map – Use a black marker to color in all areas deeper than 2 meters.

Sediment – Like all bay grasses, wild celery can grow in a variety of sediment conditions but it prefers specific conditions to maintain optimum growth rates. Sediment with high levels of organic matter (often produce a "rotten egg" smell) or rough, rocky, river bottoms are not optimum sediment conditions for wild celery growth. However, wild celery grows very well in sediment composed of a combination of medium amounts of organic matter, sand, silt or gravel.
Use a black marker to color in all sediment areas marked "UNSUITABLE".

Salinity – wild celery can grow in fresh waters to saltier waters approaching 1/7 full seawater (0-6ppt).
Use a black marker to color in all areas with salinities greater than 6 parts per thousand (ppt).

Wave Energy – The winds from storms generally increase average wave size. Typically, these storms waves are produced from winds blowing from one direction. When the winds blow across large open water areas, large waves can be capable of eroding shorelines. Shoreline areas frequently exposed to such conditions do not provide good habitat for wild celery due to heavy current and high turbidity.
Use a black marker to color in all wave energy areas marked "HIGH".

Assessment/Evaluation

Time Period Questions

1. What happened to wild celery habitat from 1600 to 1975?
2. What happened to wild celery habitat from 1975 to today?

Answers from How Scientists Identify a planting Area for Wild Celery - Time Period Questions and Answers

1 - What happened to wild celery habitat from 1600 to 1975?

In the 1600's, the area was undeveloped. All the surrounding lands were forested thus nutrient and sediment runoff was very low. Boat traffic was low and probably consisted of a few small sailboats or rowboats. Wild celery and other bay grasses covered large portions of the shallow waters.

Between the 1600 's and 1975, many changes occurred due to increased population and the resulting development. Large numbers of trees and shoreline buffers were removed. Increased shoreline development of homes, farms and industry resulted in large amounts of sediments and nutrients running directly off the land into water. The excess nutrients caused large algae blooms which blocked the sunlight needed by wild celery. In addition, large amounts of sediment runoff filled in some of the smaller rivers with a fine, highly organic silt. While boat traffic increased, wave energy and salinity did not change. Overall, wild celery habitat was greatly reduced.

2 – What happened to wild celery habitat from 1975 to today?

From 1975 to today, overall habitat conditions have generally improved. Because of tree planting and shoreline buffer protection, runoff of sediment and nutrients has been reduced. Sediment conditions have also improved. The improved water clarity has allowed Wild celery to grow in deeper waters than in 1975. Population has increased and there are more boats cruising the shallow waters than in 1975. Wave energy and salinity did not change. Overall, wild celery habitat conditions have improved since 1975.